

CLAIMS

What is claimed is:

1. 1. A pumping system, comprising:
 - 2.
 3. a submersible, centrifugal pump having a first housing section, a second housing section, a unitary intermediate body to which the first housing section and the second housing section are threadably engaged, a shaft extending through the first housing section and the second housing section, a plurality of impellers and a plurality of diffusers located within the first housing section and within the second housing section, wherein the unitary intermediate body absorbs compressive loading applied to a portion of the plurality of diffusers.
 - 4.
 5. The pumping system as recited in claim 1, wherein the shaft is a single common shaft extending through the first housing section and the second housing section.
 - 6.
 7. The pumping system as recited in claim 1, wherein the intermediate body comprises a central abutment from which a pair of threaded regions extend in opposite directions.
 - 8.
 9. The pumping system as recited in claim 1, wherein the intermediate body comprises a plurality of flow passages.
 - 10.
 11. The pumping system as recited in claim 1, wherein the intermediate body comprises at least one seal on each side of the central abutment.
 - 12.
 13. The pumping system as recited in claim 1, further comprising a submersible motor to drive the submersible, centrifugal pump, and a motor protector coupled to the submersible motor.

- 1 7. A method of assembling a pump having a plurality of stages, comprising:
2
3 assembling a first plurality of stages in a first housing;
4
5 attaching an intermediate body to the first housing;
6
7 compressing the first plurality of stages within the first housing;
8
9 connecting a second housing to the intermediate body; and
10
11 compressing a second plurality of stages within the second housing.
- 1 8. The method as recited in claim 7, wherein compressing the second plurality of stages comprises compressing the second plurality of stages with a head member.
- 1 9. The method as recited in claim 7, wherein compressing the first plurality of stages comprises compressing the first plurality of stages with a compression member.
- 1 10. The method as recited in claim 7, wherein attaching comprises threading the intermediate body onto the first housing.
- 1 11. The method as recited in claim 10, wherein connecting comprises threading the second housing onto the intermediate body.
- 1 12. The method as recited in claim 7, wherein attaching comprises threading the intermediate body to a position at which a first plurality of diffusers is compressed.
- 1 13. The method as recited in claim 7, wherein compressing comprises compressing a second plurality of diffusers.

- 1 20. The method as recited in claim 19, wherein applying comprises applying the force
2 with a compression tube.
- 1
2 21. The method as recited in claim 19, wherein applying comprises applying the force
2 with a threaded compression ring.
- 1
2 22. A system for assembling a pump, comprising:
3
4 means for assembling a single pump that may be coupled into a
4 submersible pumping system; and
5
6 means for compressing groups of stages separately within the single
7 pump.
- 1
2 23. The system as recited in claim 22, wherein the means for assembling comprises
2 an outer housing.
- 1
2 24. The system as recited in claim 22, wherein the means for compressing comprises
2 an intermediate body.
- 1
2 25. A method of increasing the potential length of a multistage pump in which each
2 stage has an impeller and a diffuser, comprising:
3
4 a. alternately stacking a diffuser and an impeller over the shaft;
5
6 b. locking the impeller to the shaft;
7
8 c. pulling the shaft to draw the impeller towards the diffuser; and
9
10 d. repeating steps a., b. and c.

- 1 26. The method as recited in claim 25, wherein repeating comprises repeating steps
- 2 a., b. and c. for each stage of the pump.
- 1 27. The method as recited in claim 26, further comprising compressing the diffusers.
- 1 28. The method as recited in claim 25, further comprising varying a distance the shaft
- 2 is pulled for different stages.
- 1 29. The method as recited in claim 25, wherein pulling comprises lifting the shaft.
- 1 30. The method as recited in claim 25, wherein alternately stacking comprises
- 2 alternately stacking a single diffuser and a single impeller over the shaft.